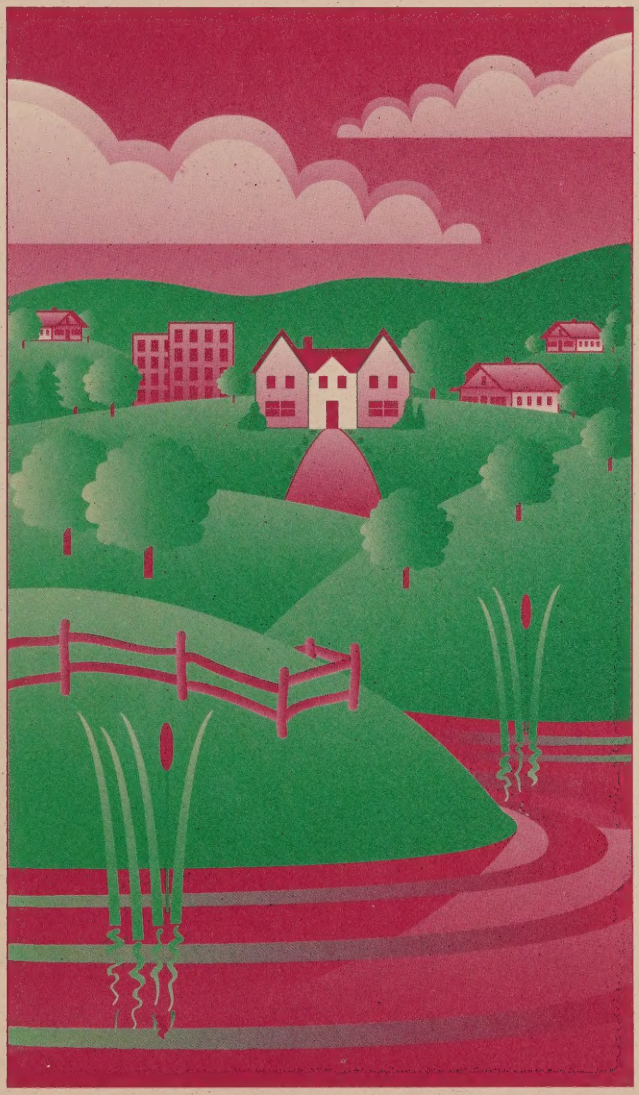
VOLUME 4

ENVIRONMENTAL LIVING:

PROTECTING THE ENVIRONMENT...

AT THE COTTAGE



MINISTRY OF
ENVIRONMENT AND ENERGY

Ontario

VOLUME 4

ENVIRONMENTAL LIVING:

PROTECTING THE ENVIRONMENT...

AT THE COTTAGE

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Environmental Living: Protecting the Environment ... at the Cottage

About "Environmental Living"

Would you like to do something to help the environment — but do you feel overwhelmed by the magnitude of the problems? Do you wonder if your efforts as an individual can make a difference?

Take heart. "Environmental Living" was written for all those people who want to protect the environment but need to know how and where to get started.

The pages of "Environmental Living" describe how to conduct your everyday activities in ways that are environmentally friendly. It's a "primer" on environmental topics that affect people who live in the city, people who live in the country and people who spend time in the great outdoors. Everything is explained in simple, easy-to-understand, easy-to-remember language.

Do you want to know how to cut down on the garbage you generate? How to start a compost heap? How to drive your car to improve its energy efficiency, lengthen its life and reduce the pollution it creates? "Environmental Living" shows you how easy it is to do all these things.

Do you live in the country — or are you thinking about buying a cottage or rural property? Do you want to learn how to look after your septic tank system? How to test for bacteria in your well water? How to build an environmentally friendly dock? "Environmental Living" looks at all these topics, and more.

Do you spend a lot of time in the great outdoors? Do you want to know how to avoid insects? What to do about zebra mussel infestations in the Great Lakes? If it's safe to eat that fish you caught? "Environmental Living" has the answers.

Living environmentally doesn't mean you have to become an environmental expert. You don't have to spend a lot of money or time. Nor do you have to make wholesale changes to your life.

No single, dramatic act by one person can save this planet. But all of us, doing a lot of simple, commonsense things, *can* save it — a little bit at a time.

What You'll Find in "Environmental Living"

"Environmental Living" is an unusual concept in publishing. It is one book, but it is published in five separate sections. You, the reader, decide which topics you want to read about, and you need order only those sections.

This means "Environmental Living" uses less paper, and you, the reader, don't have to wade through pages and pages of information you don't need.

To order any section of "Environmental Living", contact the Ministry of Environment and Energy by telephoning the Public Information Centre in Toronto at (416) 323-4321 or toll-free at 1-800-565-4923.

Each section of "Environmental Living" consists of several chapters that share a common theme. Every section and chapter is self-explanatory but, as you read them, you may come across references to other sections or chapters that can give you related or more detailed information. Those sections and chapters will be referred to by their complete titles, to make it easy for you to order that section.

At the end of each chapter is a list of publications you may want to read to get even more detail or technical background information; there's an explanation of where and how to obtain copies of those publications.

Here's a list of chapters in each section (a description of the chapter's contents follows, in brackets).

Environmental Living: Protecting the Environment ... in Your Home

There's information of interest to everyone in this section, which has chapters about handling waste, non-toxic cleaning, how to drive to minimize pollution, and what you can do about global issues such as acid rain and global warming.

- "What a Load of Garbage!" The 3Rs
  (Describes the 3Rs and what to do with your garbage);
- The 3Rs, Take Two: Little Things Mean a Lot
  (Quick tips on practising the 3Rs);
- Cleaning Without Chemicals: Recipes for a Non-Toxic Planet
  (Making your own non-toxic cleaning products);
- Cleaning Without Chemicals, The Sequel: The Non-Toxic Cleaning Kit (Quick cleaning tips);
- Not Down the Drain: What to do With Household Hazardous Waste
- Water, Water Everywhere
  (How to conserve water);
- Your Car and the Drive for a Healthy Environment
  (How your driving habits affect the environment);
- Good News about Acid Rain
- Global Warming: The Gloves are Off
  (What you can do about global warming).

Environmental Living: Protecting the Environment ... in Your Yard and Garden

Do you want environmental tips you can put into practice in your backyard? Read these.

- A Down-to-Earth Guide to Composting and Vermicomposting
- A Grassroots Look at Your Lawn
  (Growing a lawn that looks after itself);
- Those Pesky Bugs! And Other Small Hazards of the Great Outdoors (Controlling insects);
- Using Insecticides Safely
- Too Close for Comfort: What to Do About Nuisance Animals.

Environmental Living: Protecting the Environment ... when Building or Buying Your Dream Cottage

If you are buying a cottage or rural property, read these.

- Before You Take the Plunge: Rural Life is Different
  (Adjusting to country living);
- Bylaws and Buildings: Unravelling the Red Tape
  (Building and zoning laws and permits);
- Dig a Well to Tap into Groundwater Supplies
  (How to construct a well);
- This is a Story about Sewage. Skip It and You'll Be Sorry
  (Disposing of sewage when there's no municipal sewer system);
- Landscaping You Can Live With
  (Landscaping to protect and blend into the environment and to attract wildlife).

Environmental Living: Protecting the Environment ... at the Cottage

Water quality (both groundwater and lake water) is emphasized in this section.

- Testing the Waters: Bacteria and Your Drinking Water
  (Getting safe drinking water from your well);
- Every Cottager's Covert Operation: Maintaining that Septic Tank System (How to run your septic tank system trouble-free for years);
- Keeping Aquatic Plants Under Control for Boating and Swimming
- Stop Old Age from Ruining Your Lake
  (Avoiding eutrophication of your lake);
- All the Dirt on Shoreline Alterations
  ("Do's and don'ts" of changing the natural shoreline);
- Gimme Shelter: Building Docks and Boathouses
  (Environmentally friendly structures).

Environmental Living: Protecting the Environment ... in the Great Outdoors

This section will interest outdoors enthusiasts.

- Campfires and Cookouts
  (Fire safety);
- Could Swimming in Your Lake Make You Sick?
  (Diseases and parasites that affect swimmers);
- Great Lakes! The Zebra Mussel Story
  (The spread of zebra mussels in Ontario's waterways);
- Boating and the Environment
- Goin' Fishing: Should You Eat the Catch of the Day? (Contaminants and the consumption of sport fish).

Testing the Waters: Bacteria and Your Drinking Water

The first long weekend of summer is here — time to open up the cottage for another season. You air out the rooms, turn on the electricity, haul out the lawn-chairs. As you turn on the taps for the first time in months, you may wonder: Is the water safe to drink?

If your water is supplied by a municipality, the answer is yes. Municipally-supplied water is treated to remove harmful substances; then it is piped to its users. (It's wise, though, to start the new season by flushing your system — run the taps steadily for awhile to ensure you're drawing on freshly-treated water.)

If your water comes from a well, the answer is .... maybe. Well water is actually groundwater (water from underground sources). Two-thirds of the world's fresh water comes from below ground. Many Ontarians rely solely on well water for their drinking water — there are 500,000 wells in use in Ontario.

Groundwater isn't exposed to the same kinds of pollution and contamination that surface waters are, so generally, it doesn't need to be treated extensively. From time to time, though, it can become contaminated and unsafe to drink. To be sure the groundwater from your well hasn't become contaminated, you should test it every season for excess levels of bacteria.

This chapter shows you how to test your well water and how to disinfect and store water so that it *is* safe to drink.

This chapter also tells you how to maintain your well to protect it from contamination, and how to disinfect your well if it *is* contaminated or has been recently repaired. (You should always disinfect a well after repairs or major environmental changes, for example, after heavy rainstorms.)

Testing Your Well Water — Why?

Water can be unsafe to drink when it contains too many bacteria or other disease-causing micro-organisms (such as a virus).

When you have samples of your water tested, you get a bacteriological report that tells you whether or not the water is safe to drink. The report shows the concentration of two groups of bacteria: total coliforms and fecal coliforms.

Total coliforms are always found in animal waste and sewage; sometimes they're found in soil and on vegetation. Fecal coliforms are found in human and animal wastes. When fecal coliforms are found, the cause is usually recent sewage contamination. Fecal coliforms are often associated with micro-organisms, such as viruses, that can cause disease.

Don't drink water that contains fecal coliform bacteria. Instead, get your water from a known safe source, and disinfect the unsafe water supply. Continue to have samples tested until the bacteriological reports indicate the water has responded to disinfection and is safe to drink.

What Causes Well Water to Become Contaminated?

Well water can become contaminated if:

- runoff or ground drainage seeps into unprotected surface water or poorly-sealed wells and springs;
- a new well was used before being disinfected (contaminated material gets in through the ground and pipes);
- sewage disposal systems (especially septic systems) are too close to, or are uphill from, the water source;

- the well has become contaminated indirectly, through contamination of equipment associated with your well — pipes, pumps, aerators or splash preventers.

Contamination may also happen because the well is faulty — badly located or poorly constructed. If this is the case, you may be able to fix the construction problems. Then disinfect the well (chlorinate it) before you use it again.

Any time you repair a well, it should be disinfected before you resume using it.

Stop Pollution From Getting Into Your Well

Often, a well becomes contaminated simply because pollution is trickling in through the top. You can take preventive action to be sure something as basic as this doesn't cause water quality problems. Take these steps and avoid having a well that's an open door to micro-organisms:

- Keep surface water from draining into the well. Be sure the rim is raised and clear of the ground (a rim at ground level allows rainwater puddles to collect and trickle in). The rim should also be tightly sealed (so drops of rain can't enter the well).
- The walls of the well should be sealed, too, although you don't need to seal them the entire depth of the well. Contamination usually percolates from the surface downwards. Seal the walls starting at the top of the well and continuing down three or four metres (about 10 to thirteen feet) below ground.
- Be sure the lid is sealed. Check around the rim of the well, around the pump base and around the access hole.

Testing the Waters

To test your water for bacteria, contact the municipal medical officer of health in your area, or the local office of the Ministry of Health. Ask where you can pick up sterile sample bottles, and where to drop off the filled bottles for testing by a public health laboratory. Testing is free.

You must use sterile bottles. Follow the instructions that come with them. Collect the samples and deliver them immediately — don't keep them sitting around the cottage all weekend. If possible, keep the samples cool by transporting them in a picnic cooler.

Why the fuss over fresh samples? "Old" samples won't give an accurate result. The laboratory has to test water that's no more than 48 hours old.

When and How Often Should Water Be Tested?

Any time you ***suspect the water has been disturbed*** — for example, when there's been a flood or heavy rain — you must test the water.

Any time you ***repair your well,*** you must disinfect it, and then test the water.

Any time you ***haven't used the water supply*** in a while — for example, when you first open up your summer cottage for the season — you must test the water.

In the case of disturbances to the groundwater, you probably only need to test samples once.

In the case of repaired wells, or when you open your cottage for the season, you must take samples for testing three times over a three-week period. Then, test again one or two more times later in the season.

It may seem like a chore, but taking samples isn't difficult.

Tips on Taking Water Samples

If your well has a ***hand pump***, pump the water continuously for at least five minutes before taking a sample. Then clean the mouth of the pump. Pump several more gallons of water away before collecting a sample. Allow the pump water to flow directly into the sample bottle.

To collect water ***from the tap***, first remove any aerators or other attachments from the faucet and let the water run for a few minutes before taking a sample. Don't rinse the bottle; don't change the rate at which the water flows.

If the well ***has a bucket*** — that is, there's no pump or tap, you simply dip the bucket into the well to get water — you ***must not*** fill the sample bottle from the bucket. (Bacteria in the bucket could result in a false bacteriological report.) Instead, lower the bottle itself directly into the water.

Keep the samples cool — refrigerated, if possible. Transport them in a picnic cooler to the nearest laboratory, as recommended to you by the local medical officer of health. Be sure to submit the "Bacteriological Analysis of Water" form (it comes with the sterile bottle) with the samples.

Note: Your bacteriological report may indicate the water is contaminated when it isn't. False bacteriological results may occur if your sample bottles were not properly sterilized, or if dust gets into the sample, or if you transfer bacteria from your own hands into the sample. Handle the bottles carefully.

What the Bacteriological Report Says

Coliform Bacteria
(per 100 millilitres of water)

Total	*Fecal*	*What It Says*
0 - 10	0	Three samples with these results, collected one to three weeks apart, indicate a bacteriologically safe supply if the supply is protected and located at least 15 metres (50 feet) for a drilled well, or 30 m (100 feet) for other types of wells, from any source of human or animal waste.
11 - >160	0	Unsafe for drinking unless boiled or treated.
1 - >160	1 - >60	Unsafe for drinking unless boiled or treated.
EST		Unsafe for drinking unless boiled or treated.
O/G		Not recommended for drinking. Collect another sample and identify it clearly, labelling it "Repeat Sample". If the condition persists, consult the local health unit.

What Should You do When Your Water Well is Contaminated?

If the groundwater supplying your well has become contaminated with bacteria, you'll have to disinfect the well by chlorinating it.

You should disinfect your well when:

- the bacteriological report indicates water is unsafe to drink (this can happen at the start of the season because the well hasn't been used for a while and bacteria have built up in the meantime);
- you build a new well (your contractor is required by law to disinfect the new well before its first use);
- you repair or renovate your well;
- you suspect the water is contaminated, because it tastes or smells different.

To disinfect the well, chlorinate it. It's a four-step process. Each step is described in the following text.

Meanwhile, get your drinking water from a known safe source. Don't drink your well water until bacteriological tests confirm it is safe to drink.

How to Disinfect Your Well Using Chlorine

Step One: Calculate the Right Amount of Chlorine for Your Well

To chlorinate your well, you can use ordinary five-per-cent-strength household bleach (sodium hypochlorite). Or, you can use calcium hypochlorite in granular or tablet form. (If you use the powder, mix it with water to form a solution before you add it.)

First, you have to figure out how much chlorine to put in the well. That depends on how much water your well contains. For every 1,000 litres of water in your well, you'll add one litre of chlorine bleach, or 71 grams of calcium hypochlorite.

But how do you figure out how much water is in the well?

A simple way to determine the volume of water in your well is to use the chart that follows.

How Much Water is in Your Well?

If the diameter of your well measures (in millimetres/inches)	*Then every metre of water in the well holds this much water (in litres/Imperial)*
50.8 mm (about 2 inches)	2.03 L (almost two quarts, or 1/2 a gallon)
101.6 mm (about 4 inches)	8.11 L (about 1-3/4 gallons)
127 mm (about 5 inches)	12.7 L (about 3 gallons)
152.4 mm (about 6 inches)	18.2 L (about 4 gallons)
177.8 mm (about 7 inches)	24.8 L (about 5-1/2gallons)
203.2 mm (about 8 inches)	32.4 L (about 7 gallons)
609.6 mm (about 24-1/2 inches)	291.9 L (about 64 gallons)
762 mm (about 30 inches)	456 L (about 100 gallons)
914.3 mm (about 36 inches)	656.7 L (about 145 gallons)

Now you know how much water each metre of the well can hold.

Next, measure the total depth of the well, in metres, including the depth of the well that actually contains water. (Lower a weighted rope into the well and count off its length. Subtract from the total the number of metres of rope that don't get wet.)

Then multiply the known figure (the litres-of-water-per-metre figure from the preceding chart) by the total depth of water in the well.

For example, if your well is 152.4 mm (six inches) in diameter, you know from the chart above that every metre of water in the well contains 18.2 litres (or about four gallons) of water. Say the water in your well is 20 metres (about 66 feet) deep. Multiply 18.2 by 20.

You have a total of 364 litres of water standing in your 20-metre-deep well (or, almost 80 gallons in a 66-foot-deep well).

Step Two: Put in the Right Amount of Chlorine

Now, for every 1,000 litres of well water, you need to add one litre of bleach or 71 grams of calcium hypochlorite, in granular or tablet form.

In the hypothetical example we're using here, you need to put 364 ***millilitres*** of bleach in the well.

Before you start, remove any carbon filters anywhere in the water distribution system (the filters remove chlorine). Also, completely drain your water heater so it, too, can be filled with chlorinated water.

If yours is a drilled well, the chlorine solution can be put in through the vented sanitary cap.

Once the chlorine is in the water, let it do its job. Agitate the water if you can. If the water is piped to the cottage, pump the chlorinated water through the piping system.

Let every faucet run in the cottage until you can smell the chlorine, then turn the faucets off. Don't let this waste water enter your septic tank or its tile field. Let the chlorinated water stand in the well and the piping system overnight (12 hours).

Step Three: Remove the Chlorine

The next day, remove the chlorine by pumping the water out until the well is dry, or run the taps till no more chlorine smell is present in water from the taps.

Don't let this waste water enter your septic tank or its tile field.

Step Four: Test the Water

Wait a week. Collect a water sample for a bacteriological test. Follow the instructions given earlier on testing. Once you've had two consecutive "safe" tests, you'll know your treatment has probably worked.

Meanwhile, drink only disinfected water.

Getting and Storing Treated Water

While you're waiting for the bacteriological all-clear for your well water, you'll probably be hauling in water from a known safe source.

But even ***treated*** water doesn't remain microbiologically safe indefinitely. You can keep it, refrigerated, for only a few days. If it's suspect, you should disinfect it yourself in batches, as the water is needed.

There are two ways to disinfect water so bacteria is killed: You can boil it, or you can chlorinate it.

To ***disinfect water by boiling*** it, heat it to a rolling boil for at least five minutes. The water may taste a little flat; the gases dissolved in the water have been boiled out. To correct that, let it sit in a covered container for a few hours, or pour the water back and forth from one clean container to another.

To ***chlorinate water in batches,*** use household bleach that is labelled 4 to 5.25 per cent available chlorine. Put it in the water at a ratio of eight drops for every four litres (3-1/2 quarts) of water, then stir. Let it stand for 15 minutes before you use it. There should still be a faint chlorine odor at the end of the 15 minutes; if not, repeat the process. To minimize the taste, let it stand for a few hours, or try the back-and-forth pouring exercise described earlier.

As well as disinfecting the water itself, you should disinfect the container in which you keep it. To do this, drain it and refill it with water. Add 5 millilitres of household bleach for each litre of water, (or, one ounce per gallon). Leave this in the container at least overnight, drain it out and flush the container with safe water.

If you habitually store treated water in containers, clean those containers this way twice each month.

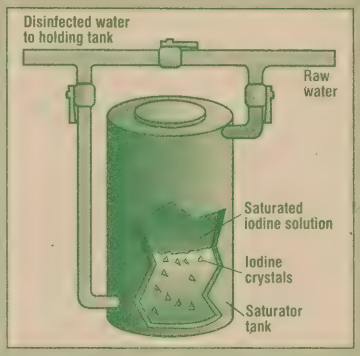
What About Home Water Treatment Devices?

Another way to disinfect water is by installing and using a home water treatment device. There are all kinds of water treatment devices on the market; some claim to disinfect water, others claim to simply improve the look and taste of it.

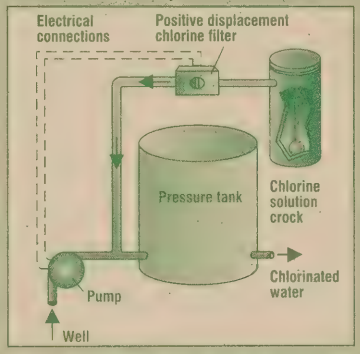
When you shop for a water treatment device, bear in mind that in Ontario, there are no legally enforceable standards that these devices must meet. It's up to the manufacturer to prove to you that the device does what is claimed.

The devices that disinfect water do so by chlorination, iodination, ultra-violet irradiation or ozonation.

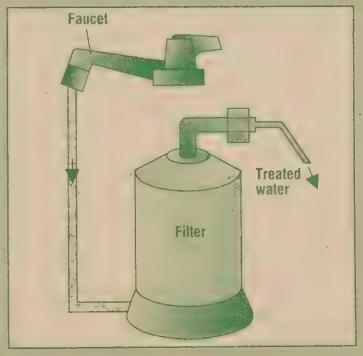
If you treat water using ultra-violet irradiation or ozonation methods, the water is safe for only a short time — the bacteria can grow again after the water passes through the treatment device.



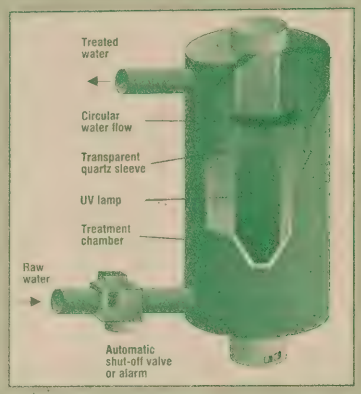
A typical (saturator type) iodine feeder



A typical hypochlorination system



A typical counter-top activated carbon filter



A typical hypochlorination system

Chlorination and iodination methods will protect your water against bacterial regrowth, because the chlorine and iodine remain in the water unless you purposely filter it out.

In these two types of treatment, the water is held in a retention tank and the disinfectant — chlorine or iodine — is added. The water must stand for several hours, so the disinfectant can work.

You can filter the water at the tap to remove the residual chlorine or iodine. In fact, if you use an iodination device, you ***should*** filter the water after to remove the iodine; over the long-term, iodine can cause allergic and other reactions in some people.

Some home water treatment devices are solely concerned with aesthetic considerations; they work by filtering out minerals or impurities. For example, activated carbon filter devices are intended to improve the taste and odor of water. Similarly, reverse osmosis devices separate dissolved minerals from water. Neither device will kill bacteria. Both devices should only be used on water that is already microbiologically safe.

More for You to Read

To order the Ministry of Environment and Energy publications in the list below, telephone the Public Information Centre in Toronto at (416) 323-4321 or toll-free at 1-800-565-4923. Please use the Public Information Bank System (PIBS) number to order publications.

Inquiries about the Environment Canada publications included in the list below should be directed to the toll-free number 1-800-668-6767; or call the Toronto office at (416) 973-6467.

A Primer on Water. Questions and Answers. Booklet. Environment Canada, Conservation and Protection. ISBN 0-662-18582-X.

Clean Water – Life Depends on It! Fact sheet. Environment Canada, Conservation and Protection. Water 3. ISBN 0-662-17338-4.

Water – Nature's Magician. Fact sheet. Environment Canada, Conservation and Protection. Water 1. ISBN 0-662-18080-1.

Water Wells and Ground Water Supplies in Ontario. Booklet. Ministry of Environment and Energy. ISBN 0-7729-1010-3 WRB.

Water Wells and Groundwater Supplies: The Protection of Water Quality in Bored and Dug Wells. Information sheet. Ministry of Environment and Energy. PIBS 601b.

Water Wells and Groundwater Supplies: The Protection of Water Quality in Drilled Wells. Information sheet. Ministry of Environment and Energy. PIBS 602b.

Water Wells in Ontario: Important Facts about Water Well Construction. Brochure. PIBS 587b.

Every Cottager's Covert Operation: Maintaining that Septic Tank System

People who live in towns and cities don't often think about where their water comes from, or where their sewage goes. Their homes are usually connected to the municipal water and sewer system. They can flush toilets, take showers, drain their sinks and run their washers without pondering too deeply the question of what happens to household waste after they pull the plug.

But handling sewage can suddenly become a big deal when you acquire a cottage or country home that has its own, self-contained sewage system. Now, you're confronted with the task of taking care of all that waste yourself. Just how *do* you look after a sewage system?

Don't worry — maintaining a sewage system doesn't take very much time or trouble. This chapter explains the basics.

What is a Septic System, and How Does it Work?

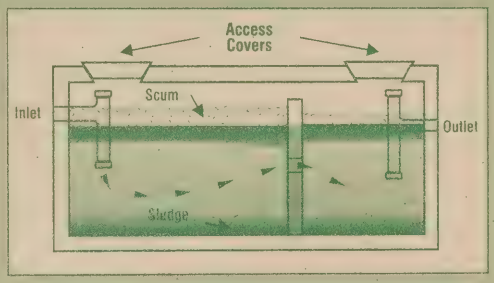
Ontario's Environmental Protection Act defines seven different types or classes of self-contained sewage systems. The systems range from simple privies right through to elaborate treatment plants for waste gathered from several sources — the kind that would be used, say, by a tent-and-trailer park or a shopping plaza.

The vast majority of private home owners choose to install a Class 4 system, or septic tank system.

Properties with septic tank systems don't look any different from those connected to municipal sewers. All the vital parts are buried underground. Usually, the system consists of a tank, a distribution box (that's optional) and a leaching bed.

Here's how they work together:

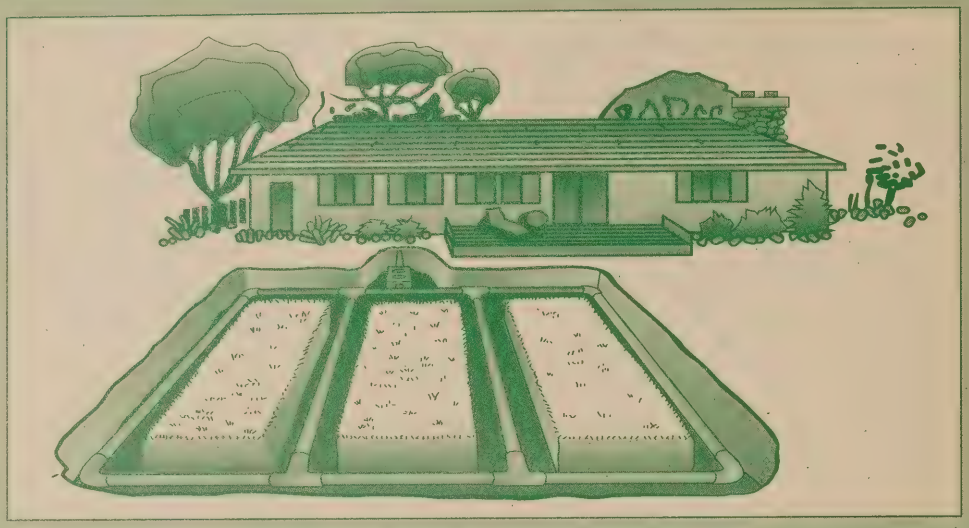
Waste material flows from your house into the septic tank. Inside the tank, all that waste material separates into layers. Solids settle to the bottom of the tank (that's called "sludge"). Greases and fats float to the top (that's called "scum"). In between is liquid waste. Every time you add sewage to the tank, an equal volume of waste is displaced to a leaching bed. The waste passes into the leaching bed through a system of plastic piping. The pipes, which have perforations in them, are laid out underground in a grid formation. The perforations allow the liquid waste to filter into the soil.



Cross-section of the Actual Septic Tank

Sewage passes into the leaching bed (which must be grassed over) and is absorbed by the surrounding soil, where it undergoes a further, natural treatment process before it enters the groundwater.

Meanwhile, back in the tank, bacteria breaks down the sludge and scum. These materials only break down so far, so they gradually accumulate in the tank. Every few years, the accumulation in your septic tank has to be pumped out by a licensed contractor.



Typical Layout of Septic Tank Tile Bed System

What About All Those Horror Stories?

Eventually, ***all*** septic tank systems must be replaced. The ***good*** news is that a properly-maintained system will last 20 years or longer — and that's based on ***year-round*** use.

If you are concerned about how well your septic tank system is working, contact the local health unit or the Ministry of Environment and Energy to arrange an inspection.

What are some of the common problems to watch out for?

One thing to check for when you acquire a cottage (or if you plan to build one) is the layout of your septic system, especially the leaching bed. Some older systems didn't allow enough distance between the system and water supplies (such as your neighbor's well or your lake). That means the septic system could foul nearby drinking water.

Another problem cottagers may encounter is the septic system that hasn't grown along with their needs: Your let's-rough-it two-bedroom summer camp has evolved over the years into a four-bedroom winterized cabin with a hot tub and dishwasher. The original system may not be big enough to handle all that water — not to mention the additional waste.

The worst problem is one that is easy to avoid. When you don't pump out your tank regularly, the solids build up inside until they gradually move out of the tank and settle in the pipes, collecting a few feet at a time. When all the pipe is used up, and the sewage can no longer leach into the soil, it will "pond" — seep to the surface of the ground, or worse yet, back up into your home.

There are no quick fixes at this stage — you've got to replace the whole system.

While every system has to be replaced eventually, you can extend the life of your septic tank system simply by having your tank pumped out every two to three years by a licensed contractor. Be sure, too, to follow the "do's and don'ts" that are listed next.

Things To Do to Extend the Life of Your Septic System

- Be sure to have your septic tank system checked over by a licensed contractor every year; have the sludge pumped out every two or three years.
- Know the exact layout of your system.
- Conserve water. You're overburdening your system when you take long showers, run the dishwasher too often, or add a hot tub to your cottage amenities.
- It follows that you should install water-conserving fixtures such as toilets, shower heads, suds-saver washing machines, etc. (Be sure they conform to Canadian standards and the plumbing code.)
- Use non-toxic, biodegradable cleaning products. Read "Cleaning Without Chemicals: The Non-Toxic Cleaning Kit" and "Cleaning Without Chemicals, The Sequel: Recipes for a Non-Toxic Planet"; both in ***Environmental Living: Protecting the Environment ... in Your Home.*** Both will give you cleaning tips and recipes for cleansers you can make yourself at next to no cost.
- Use phosphate-free or low-phosphate laundry and dishwashing soaps. Remember that the phosphorus in detergents doesn't break down in a septic system. As the phosphorus leaches into the ground and into nearby water bodies, it can cause water quality problems: Lakes will produce excessive vegetation — algae and other aquatic plants — which could ruin the water for fishing, swimming and boating. (Read "Stop Old Age from Ruining Your Lake" in this section to understand how this happens.)
- Start a compost heap for all those kitchen and household wastes you'd normally put down the drain. Read "A Down-to-Earth Guide to Composting and Vermicomposting" in ***Environmental Living: Protecting the Environment ... in Your Home.*** Don't install a garbage disposal device.
- Call your municipal health unit or the nearest office of the Ministry of Environment and Energy if you think you've got a septic problem, or if you think your neighbor does. If you feel uncomfortable about "turning in" a neighbor, remember, it's your water supply and your lake that the neighbors are putting at risk. Your complaint remains confidential.

Don't Do These Things to Your Septic Tank System

- Don't skimp on the design of, or specifications for, your septic tank system. Spend a few hundred dollars more now for a bigger septic tank — one that can handle increased waste resulting from future improvements to, renovations of, or increased use of, your cottage. It will save you thousands of dollars later, and eliminate aggravation. (What price do you put on your peace of mind?)

- Never try to inspect, pump out, or fix your own septic tank, or anyone else's. There is no oxygen in a septic tank for you to breathe. The tank does, however, contain toxic fumes that can kill you in seconds. A licensed contractor knows how to work safely in these conditions.
- Don't put grease or non-biodegradable products in the system. They won't break down, and they'll inhibit the bacteria in the septic tank from working on other waste materials.
- Don't add so-called "miracle products" to the system. Normal sewage contains all the bacteria the system needs to keep breaking down the sludge.
- Don't put hazardous waste down the drain. The chemicals in paint, thinners and toilet bowl cleaners will leach into your well water and your lake. They'll also inhibit the bacteria that's at work inside the septic tank.
- Don't park any vehicle, or any heavy equipment, on the leaching bed area. Their weight will crush the pipes; they can also compact the soil, which could cause the system to freeze in winter. Don't ski or drive snowmobiles over the leaching bed in winter, for the same reasons.
- Don't ignore the facts. If, in the middle of a drought, the grass over the leaching bed is as green as Ireland, your system is close to failure. Similarly, it's already too late if you can walk over your leaching bed and discern that it's wet, though there's been no rain. Your system needs to be replaced.

If you're thinking about buying a lot to build a cottage — or if your existing septic tank system needs to be replaced — read "This is a Story About Sewage. Don't Skip it or You'll be Sorry." It's in ***Environmental Living: Protecting the Environment ... when Building or Buying Your Dream Cottage.***

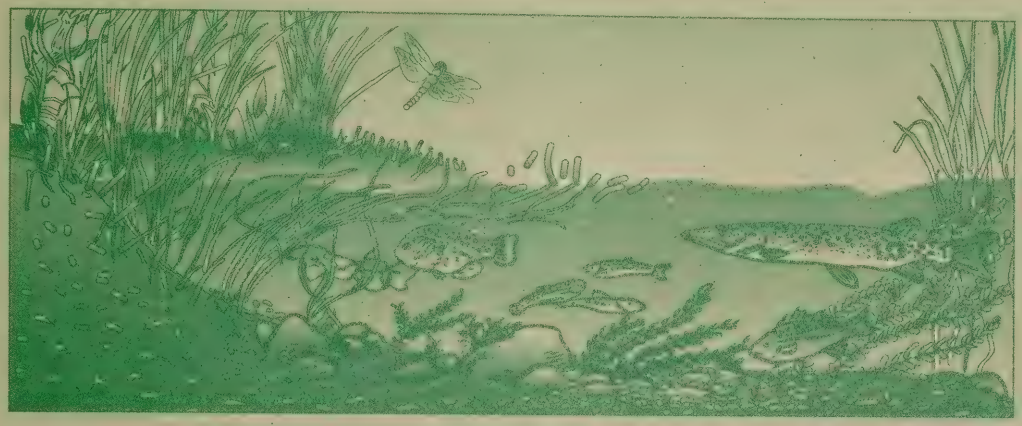
More for You to Read

To order the Ministry of Environment and Energy publications listed below, telephone the Public Information Centre in Toronto at (416) 323-4321 or toll-free at 1-800-565-4923. Please use the Public Information Bank System (PIBS) number to order publications.

Class 1, 2 and 3 Sewage Systems. Fact Sheet.
Ministry of Environment and Energy. PIBS 599b.

Septic Tank Systems. Fact Sheet.
Ministry of Environment and Energy. PIBS 600b.

Keeping Aquatic Plants Under Control for Boating and Swimming



Cottagers, does it seem as if your lake is being "taken over" by algae and other aquatic plants? What should you do when they grow so thick that swimming becomes unpleasant and plants get tangled in your boat's propellers?

Aquatic Plants Have Their Place in the Environment

Before you do anything, put things in perspective. The lake at your cottage isn't the same environment as a backyard swimming pool. A lake is a community of living things — plants, fish, wildlife — linked together in a complex ecosystem. It's all part of the cottage experience.

There are two types of aquatic plants. Macrophytes are rooted plants that derive their nutrients (food) from sediments in the lake bed. Some macrophytes are submerged (*some* leaves may float on the surface) while others are emergent plants (*most* of their foliage is on the surface). Then there's algae — more familiarly known as "pond scum" — which doesn't take root but floats, suspended, in the water; algae derive their nutrients from the water itself.

Both algae and macrophytes are important to the life in your lake.

Algae form the base of the food chain in the lake. They provide food for zooplankton and other small organisms, which in turn provide food for fish and other aquatic life.

Macrophytes provide food, shelter and spawning and nursery grounds for fish.

They also foster wildlife: Their seeds and tubers are food for herbivores as diverse as waterfowl and moose. Macrophytes also offer protection and "cover" to birds, amphibians, reptiles and other animals.

To some people, macrophytes may seem to be nuisance weeds, but bear in mind they help stabilize shorelines and lake bottoms; they reduce the incidence of erosion and help maintain the quality of the water.

The benefits that algae and macrophytes offer your lake probably far outweigh the inconveniences!

Aside from the nuisance it may pose to swimmers and boaters, does excessive aquatic plant growth pose problems to the lake? Yes — it upsets the biological balance of the ecosystem.

Living aquatic plants use oxygen to breathe, and dying aquatic plants use up oxygen as they decompose. When there are too many aquatic plants in a lake, they use up too much oxygen, depriving other species (such as fish) that also need oxygen to survive. Also, when plants grow too thickly, they crowd out other species; for example, fish are deprived of habitat.

Excessive algal growth results in problems similar to those caused by excessive growth of macrophytes: Algal "blooms" — cyclical peaks in algae populations — use up a great deal of the dissolved oxygen in the water.

Algal blooms are esthetically unappealing. Some produce toxins that make the water unsafe for drinking. Algal blooms compete with rooted aquatic plants for sunlight, shading out the macrophytes, which die off.

What causes excessive aquatic plant growth?

Sedimental Journeys

Excessive aquatic plant growth and algal blooms are largely caused by human activity around a lake. One specific cause of excessive aquatic plant growth is sediment input — too many sediments are washing out of the watershed and into the lake, giving plants a foundation in which to take root.

Sediment input occurs when people clear their lots of natural vegetation, sometimes right down to the shoreline. "Improving" the natural shoreline (for example, by filling, dredging, or building docks and boathouses) can also cause sediment input problems.

There's a very simple way to avoid this problem: Don't change the natural shoreline. Don't clear away natural vegetation on your property — leave it there to control erosion. In fact, you should consider planting *more* vegetation on your land.

Building on, or altering your shoreline can also cause sedimentation problems. That's why you can't build anything on or near the water without a permit. There are ways to build a dock, create a beach, and make a channel for your boat, that have very little impact on the environment. Read "All the Dirt on Shoreline Alterations" and "Gimme Shelter: Building Docks and Boathouses" in this section.

Nutrients: Too Much of a Good Thing

Even more serious than sediment input is the problem of nutrient loading. It occurs when people allow too many nutrients, particularly phosphorus (which is found in lawn fertilizers and some washing detergents), to end up in the lake. Nutrients also enter the water from septic systems and from runoff from farming operations.

It's obvious when you think about it: The nutrients that help your lawn and crops grow, will have the same effect on the aquatic plants and algae in your lake.

Nutrient loading is the main cause of excessive plant growth. If you can correct this, you've found the only long-term solution to the problem. How do you cut down on the nutrients you load into your lake? Read "Stop Old Age from Ruining Your Lake" in this section.

What to Do

Meanwhile, is there a short-term fix that will get you through the summer? Yes. You *can* control plant growth — but only to a limited degree. Bear in mind that anything you do — no matter how inconsequential your action may seem in the complicated workings of a lake's ecology — can have a profound effect on the ecosystem, and on its fish and wildlife. Multiply ***your*** weekend project by the number of similar "small" projects your fellow-cottagers undertake, and the cumulative impact could be enormous.

That's why agencies such as the provincial Ministry of Environment and Energy and the Ministry of Natural Resources require you to apply for a permit anytime you attempt to control plant growth in your lake.

Contact the local district office of the Ministry of Natural Resources to discuss physical/mechanical ways to control plant growth, and to apply for a work permit for this type of work. The MNR is responsible for issuing such work permits because its mandate includes the protection of plants, fish and wildlife (The MNR also co-operates with the federal authorities to enforce the federal Fisheries Act.)

If you are considering chemical treatment, contact the Ministry of Environment and Energy. The MOEE is responsible for administering Ontario's Pesticides Act and its regulations, which control the sale and use of pesticides in Ontario. The MOEE is responsible for processing your application for a permit to purchase and use pesticides.

What are the options? You could try physical/mechanical methods or chemical methods, or a combination of these methods. Every lake — and the community of plants living in it, and the community of people living around it — is different. The Ministry of Natural Resources and the Ministry of Environment and Energy can help you sort out the best options.

Whether you opt for physical or chemical treatment, bear in mind that neither method is a long-term solution, and the results will only last as long as the summer.

Cutting Back Beats Chemicals: Physical/Mechanical Control Methods

One way to control macrophytes is to physically remove some — not all — plants. This can actually benefit the lake, especially fish, by adding to the diversity of habitat and allowing fish and wildlife new access points to the remaining vegetation. To physically remove some vegetation, you can hand-pull plants or use a small hand-operated cutter bar mounted on a boat. This is only practical if you want to treat a relatively small area.

Extensive aquatic plant and algal growths can interfere with boating and swimming

You must be sure to *remove* the plants from the water. (They can be composted.) Otherwise, they may simply take root again. Or they may decompose and wash onshore (creating quite a smell) or sink to the bottom of the lake, removing vital oxygen from the water as they decompose.

To remove vegetation on a larger scale, you might consider joining forces with your neighbors to use floating harvesting machines.

Getting a Work Permit

To remove any plants using physical/mechanical means, you must apply for a work permit from the Ministry of Natural Resources. For information on applying for a work permit, read "All the Dirt on Shoreline Alterations" in this section.

Using Herbicides and Algicides to Control Plant Growth

You can also apply chemicals. Herbicides control macrophytes; algicides control algae. But keep in mind these points: Like mechanical methods, chemicals are temporary fixes. Also, chemicals may have an effect on the fish populations in your lake. Thirdly, as with physical/mechanical methods, you must apply for a permit, this time from the MOEE.

First, decide what vegetation you want to control: algae or macrophytes. Make sure you know exactly which plants you want to treat. Then choose a pesticide that is specifically formulated to treat those plants (they will be listed on the label).

Anytime you use a pesticide, you must follow the label instructions to the letter. The label is actually a legal document — so to do otherwise is against the law.

Next, you must plan exactly ***when*** you'll do the treatment. You need to keep in mind that treatment is most effective on young plants, early in the season. At the same time, the treatment mustn't coincide with fish spawning times (that's spring and early summer for many warmwater species).

The Ministry of Environment and Energy can advise you which pesticides to use and when to use them, when you apply for permission to buy and use the pesticide.

It's important that you handle pesticides safely. To get some understanding of what's involved, read "Using Insecticides Safely" in ***Environmental Living: Protecting the Environment ... in Your Yard and Garden.*** Many of the same safety rules apply.

Getting a Permit to Purchase and Use Pesticides

When you submit your "Application for a Permit to Purchase a Pesticide and/or Perform a Water Extermination", you have to prepare some paperwork, including a map showing the location of your property and a more detailed map showing the property's features. You'll also have to notify your neighbors. (If you're part of a group of cottagers, you can apply, as a group, for one permit.)

The permit ensures that the pesticide is purchased and used in a responsible way. You will be authorized to use a specific pesticide in a specific amount, under strict conditions and in a limited area.

To apply, contact the district or regional Ministry of Environment and Energy office nearest your lake. The ministry will give you an application form and instructions on how to complete it. It takes about six weeks to process a permit, which is valid throughout the approved treatment period in the calendar year in which it is issued.

What About Dredging a Boat Channel ... Altering the Shoreline ... Building a Dock?

Just about any work you want to do in, on, or near water requires that you apply for a work permit from the Ministry of Natural Resources. That applies not only to projects to physically remove aquatic plants, as described earlier, it also applies to anything you may want to ***build*** on or near the shore.

Even small projects, such as repairing your dock or building a boathouse, can damage fish and wildlife habitat. Remember, too, the beds of most waterbodies are Crown (or public) lands, not private lands.

These issues — fish and wildlife habitat, and use of Crown land — are issues under the jurisdiction of the Ministry of Natural Resources. Contact the MNR to find out what you need to do to get a permit to do shoreline work. Read "All the Dirt on Shoreline Alterations" and "Gimme Shelter: Building Docks and Boathouses" in this section.

More for You to Read

To order the Ministry of Natural Resources publications included in the list below, telephone the Public Information Centre in Toronto at (416) 314-1553.

Planning certain activities on public lands and shore lands? Get an MNR Work Permit before you start. Pamphlet. Ministry of Natural Resources. ISBN 0-7729-7519-1.

Shoreline Conservation and Work Permits. Pamphlet. Ministry of Natural Resources. ISBN 0-7729-8537-5.

Working Around Water. What You Should Know. Brochure. Ministry of Natural Resources. ISBN 0-7729-7549-3.

Working Around Water? What you should know about fish habitat and building materials. Fact sheet. Ministry of Natural Resources.

Working Around Water? What you should know about fish habitat and docks and boathouses. Fact sheet. Ministry of Natural Resources.

Working Around Water? What you should know about fish habitat and dredging boat channels and swimming areas. Fact sheet. Ministry of Natural Resources.

Working Around Water? What you should know about fish habitat and erosion control. Fact sheet. Ministry of Natural Resources.

Working Around Water? What you should know about fish habitat and work permits. Fact sheet. Ministry of Natural Resources.

Stop Old Age from Ruining Your Lake

What do dirty clothes, dishwater and lawn fertilizer have in common? They all contribute to the aging of the lake beside your house, farm, or cottage. A lake evolves from water, to bog, to dry land over many years. Given natural conditions, this evolution takes tens of thousands of years. The way you launder your clothes, do your dishes and fertilize your grass, can dramatiacally speed up this process.

How a Lake Evolves

Does this sound like the lake alongside your cottage? It's a deep, clear lake located in the Precambrian Shield. There isn't an over-abundance of aquatic plants. You fish for coldwater species, such as lake trout; they're not present in great numbers, though. If this is your lake, it's an oligotrophic one.

Oligotrophic lakes hold a lot of oxygen and very few nutrients. (The geology of the Precambrian Shield area, where the land is mostly granite, doesn't lend itself to allowing nutrients to be carried into water.) In terms of aging, oligotrophic lakes are "young" lakes.

What if your cottage is in central or southern Ontario? In your lake, the water is probably shallow and cloudy. It may be affected by erosion of the surrounding soils and is filling in with sediments. There are lots of aquatic plants, and the fish are warmwater species. If this sounds like your lake, it's referred to as a eutrophic lake.

Eutrophic lakes are "old" lakes, lakes that are farther along the process of transforming from water to bog to land. This happens as the lake fills in with sediment eroded from the watershed.

Whether your lake is oligotrophic, eutrophic, or mesotrophic (has characteristics that are in between the two extremes), you and your neighboring cottagers can make a tremendous difference to the biological balance of your lake.

On a big scale, things like clearing the land around the lake, developing cottage lots, putting industrial or municipal discharges into the lake and farming, can alter the natural environment. All these activities increase erosion and sedimentation and add "nutrients" (the same things that make crops and gardens grow) to your lake, significantly changing its biological processes.

On an individual scale, your day-to-day living habits at the cottage can also add these harmful nutrients to the lake — or hold some back. Later, we'll look at how you can affect this process. First, an explanation of the basics of lake biology and how too many nutrients can speed up the natural eutrophication process.

Life and Death in a Lake

Lakes and the plants, fish and animals that live in and around them are all part of an interdependent life cycle. Temperature, water depth, the amount of "dissolved" oxygen (oxygen in the water), the nutrients available to feed the living things in the lake — all these things affect a complex ecosystem.

Encouraged by sunlight and nutrients, aquatic plants, including algae and macrophytes (rooted plants) grow in the water, providing food and habitat for fish. As the algae and other plants die and sink each season, they decompose in the bottom sediments of the lake. This decomposition process consumes oxygen — too much oxygen, and fish may be

harmed — and the plant materials fill in the lake over many years. Gradually the lake will become a bog, and finally, land.

Lakes must "breathe". An oxygen supply is vital to the functioning of a lake ecosystem and to the survival of algae, plants, invertebrates and fish. In eutrophic lakes, which are often shallow, wind action on the surface of the water usually "mixes" oxygen into the lake. In oligotrophic lakes, which are deep, wind action isn't enough to get oxygen into the colder, deeper layers of the lake where coldwater fish live. Oxygen is instead replenished when the lake "turns over" in spring and fall. (The changing temperatures cause the oxygen-rich upper levels of the lake to sink, mixing and circulating oxygen.)

These are all natural processes. There's a least one outside factor that can upset the whole equilibrium. That's when too many nutrients — specifically, phosphorus — get into a lake. And this is where you, as a cottager, come into the picture.

What is Nutrient Enrichment?

Nutrient enrichment happens when a lake is over-rich in organic and mineral nutrients. When too many nutrients (especially phosphorus) get into a lake, the natural balance of the lake ecosystem is upset.

Phosphorus, a fertilizer, helps your lawn and garden grow. It also encourages algae to grow — and grow — and grow. When there's too much growth, you'll see problems compounding, though it may take years. These problems include thick scum, slime, or foul-smelling ooze that develops on the surface. As well, dense mats of algae and other decaying vegetation build up, making the water taste funny.

When the algae and other aquatic plants die, they settle to the bottom of the lake, and the decomposition process uses up oxygen in the water.

The decomposition of those plants makes it possible for the nutrient phosphorus to be "bound" to sediments in the lake, in effect keeping the phosphorus contained. But in a eutrophic lake, as oxygen is used up by decaying algae and other water plants, the phosphorus can be resuspended into the water. The phosphorus nourishes the algae. The eutrophication process speeds up.

Oligotrophic lakes can also become prematurely enriched. In summer, oxygen — even in deep cold water — can be used up by algal decomposition, and coldwater fish may suffer. If all the oxygen is used up, phosphorus can build up as it is resuspended out of sediment storage. And suddenly, your lake has an over-enrichment problem.

Now, here's the *good* news: You can do something to protect your lake from over-enrichment.

How You Affect the Enrichment of Your Lake

Dumping excess nutrients into a lake will speed up its natural eutrophication process. The nutrient to watch out for is phosphorus. You already know it's present in fertilizer and agricultural products. What's phosphorus got to do with your cottage?

Every time you flush the toilet, turn on the dishwasher, launder your clothes, or fertilize your lawn, you're adding nutrients to your lake.

But you can turn the situation around so that you're putting virtually ***no*** nutrients into your lake or the surrounding watershed. Here's how:

- Be sure your septic tank/wastewater system is working correctly.

- Cut down or stop using products containing phosphorus. Your septic tank system doesn't break down phosphorus or dilute it — it still ends up in the ground around your cottage, and eventually, in your lake.
- Use liquid dishwashing detergent for handwashing and dishwashers — it has one-third the phosphate content of powders. Wash your dishes just once a day, and cut down dishwasher use at the cottage.
- Buy and use laundry detergent with a low-phosphate or no-phosphate content. Phosphates were big news 20 years ago. Before federal regulations passed in 1970 to restrict the phosphate content of detergents, 50 per cent of all the phosphorus in municipal sewage was contributed by detergents.
- Don't use synthetic fertilizers on your cottage lawn, and/or fertilize less frequently. The nitrogen in commercial fertilizers make your lawn greener — but it also runs off into your lake to fertilize the algae and other aquatic plants, too. Read "A Grassroots Look at Your Lawn" in ***Environmental Living: Protecting the Environment ... in Your Yard and Garden.***
- Keep the trees and shrubs and other natural vegetation on your property. They reduce soil erosion and protect lake waters. They'll also take up a little bit of those nutrients that reach the ground water from your septic tank system.

How You Live at the Cottage Makes a Big Difference to the Health of Your Lake

The fewer nutrients — such as nitrogen and phosphorous, found in all kinds of household products — you use at your cottage, the healthier your lake will be.

Look at the potential long-term difference in phosphorus loading between a cottage family that cuts back on the use of phosphorus products, and another cottage family that doesn't.

High Phosphorus Use		*Low Phosphorus Use*	
Human waste	535 g	Human waste	535 g
Dishwasher using powdered detergent and used once a day	650 g	No dishwasher (or dishwasher using phosphate-free detergent)	0 g
Lawn (30 m x 30 m or 100 ft x 100 ft) fertilized once a year using fertilizer containing 10 per cent each of nitrogen, phosphorus and potassium	1,960 g	No fertilizer	0 g
Lot cleared of trees	30 g	Trees not cut down	20 g
Household products containing phosphates used regularly	180 g	Phosphate-free household products used	20 g
TOTAL PHOSPHORUS LOADING	3,355 g	TOTAL PHOSPHORUS LOADING	575 g

Look at the potential difference — just one "high-phosphorus" cottage can have the same impact on a lake as six "low-phosphorus" cottages.

Where did these numbers come from? They're based on surveys of cottagers in the Muskoka/Haliburton area in 1978.

These calculations assume 3.7 people use the cottage about 90 days of the year. The cottage is on a lot 40 x 80 metres (130 x 260 feet).

These Symptoms are NOT Signs of Eutrophication

It's a mustard yellow powder floating on the surface water in early summer. It looks like an oil or chemical spill. Is it bad? No — it's pine pollen. In June, coniferous trees (evergreens) release this yellow pollen. (Deciduous trees — broadleafed ones — release sandy brown or grey pollen.) As the wind blows the pollen across the lake, it accumulates on the shoreline, trapping floating algae and debris with it. It looks bad, and may smell as it decomposes. But it's completely natural and will dissipate by early July. Relax.

What about foam? Isn't that a sure sign too much detergent is getting into the water? No. Oddly, foam can be a completely natural phenomenon on some lakes, especially in the Precambrian Shield. It depends on how much plant life is in the lake and the amount of open water (which produces lapping waves).

Let's demystify the foam phenomenon: Organic materials accumulate in lakes after a heavy rain. As the material decomposes, it produces compounds that are like the fatty acids in soap. In the Precambrian Shield, where the water is soft, you'll find more of these compounds, so you can expect to see foaming on these lakes.

On some lakes, the foam actually looks like long streaks. This effect happens because a combination of wind and wave action causes a circulating pattern on the surface of the water. This streaky foam (Langmuir streaks) is completely harmless.

How Do You Know If Your Lake is in Danger?

There's a simple way to determine if your lake is oligotrophic (has few nutrients), mesotrophic (has some nutrients), or eutrophic (has too many nutrients). You should measure the clarity of the water, and how

How's Your Lake?
Nutrient Loading and How to Interpret the Secchi Disc and Water Samples

If the Secchi Disc disappears at ...	*If Chlorophyll A tests show density of ...*	*Your Lake is ...*
5 metres or more	Up to 2 micrograms per litre (low algal density)	Unenriched, Oligotrophic
3 - 5 metres	2 - 4 micrograms per litre (moderate algal density)	Moderately enriched, Mesotrophic
0 - 3 metres	4 or more micrograms per litre (high algal density)	Enriched, Eutrophic

much algae is growing as a result of the presence of nutrients. If the water seems to be losing its clarity through the years, there are too many algae — your lake is over-enriched with nutrients.

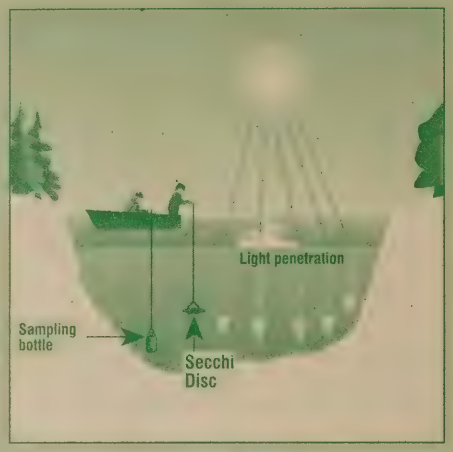
To measure water clarity, use a Secchi Disc. It's a round, flat metal disc. The flat surface is divided into quarters, painted alternately solid black and solid white. A standard Secchi Disc is 20 centimetres (almost eight inches) in diameter.

Away from shore, lower the disc into the water and note the depth at which it disappears from view.

If the disc disappears at a relatively shallow depth (see the chart on page 25), that indicates there's a lot of algae growing in your lake. The lake has too many nutrients.

As well, you need to know just how *dense* the algal growth is in your lake. Your cottagers' association should supply water samples regularly to the Ministry of Environment and Energy. The samples can be analyzed to see how much "chlorophyll a" (the amount of green pigment in most plants and algae) is present. The higher the density of chlorophyll a, the more nutrient-enriched is your lake.

The Ministry of Environment and Energy has a "Self-Help Program" you or your cottagers' association can join. Volunteers simply supply the ministry with water samples and Secchi Disc readings about six times each season (from May to September). The ministry analyzes the data.



Unenriched Lake

Enriched Lake

Using a Secchi Disc is a simple way for cottagers to measure water clarity and estimate the degree of their lake's enrichment

The Self-Help Program is available for lakes in the ministry's northeastern, southeastern and central regions (those regional offices are located in Sudbury, Kingston and Toronto, respectively). Contact the appropriate Ministry of Environment and Energy regional office to volunteer, or to find out if someone on your lake is already a volunteer.

It takes several years of tracking water clarity and algal concentration to figure out how nutrient-enriched your lake may be. By doing so, you'll understand what's happening to your lake and can take steps to keep it in good condition for swimming, boating and fishing.

More for You to Read

To order the Ministry of Environment and Energy publications included in the list below, telephone the Public Information Centre in Toronto at (416) 323-4321 or toll-free at 1-800-565-4923. Please use the Public Information Bank System (PIBS) number to order publications.

Inquiries about the Environment Canada publications included in the list below should be directed to the toll-free number 1-800-668-6767; or call the Toronto office at (416) 973-6467.

Foaming of Surface Water: A Natural Phenomenon on Ontario Lakes. Information sheet. PIBS 703b.

Clean Water - Life Depends on It! Fact sheet. Environment Canada, Conservation and Protection. Water 3. ISBN 0-662-17338-4.

Water - Nature's Magician. Fact sheet. Environment Canada, Conservation and Protection. Water 1. ISBN 0-662-18080-1.

All the Dirt on Shoreline Alterations

It seems there's always something else you can do to improve your cottage. Maybe you'd like to build a dock or a boathouse .... or erect a breakwater .... or put down sand for a beach .... or dredge a channel for the boat.

But the phrase "home improvement" takes on a whole different meaning at the cottage, because the shoreline you prize so highly is also home to fish and wildlife of all kinds. Biologists call this the littoral zone; it extends from the high waterline to the deep water dropoff where rooted submerged vegetation grows.

This littoral zone is narrow, fragile — and extremely rich as a habitat for insects, crayfish, fish and amphibians; other wildlife, in turn, feed on ***them*** as well.

It doesn't take much to alter the delicate balance of this fragile ecosystem. Just one or two little weekend projects at the water's edge ... multiply your projects by the number of your cottage neighbors doing the same .... and say goodbye to the aquatic wildlife.

That's why you can't undertake any project in, on, or near the water, unless you have a permit to do so.

What? Another piece of red tape?

On the "plus" side, applying for a permit is not necessarily a complicated business. In most instances, you only have to go through one agency — the Ministry of Natural Resources.

The MNR is responsible for administering Ontario's Public Lands Act, which in part concerns itself with the beds of navigable water bodies (such as your lake). The MNR can also act to enforce the federal Fisheries Act where there are concerns about fish habitat.

Instead of submitting separate applications to two levels of government — both concerned with shoreline development — you can apply for a single permit from the MNR.

There are strong incentives for getting a permit, not the least of which is getting good advice from an expert source.

You'll learn how to get your project done without harming the environment (and maybe even ***improving*** it for fish and other aquatic life). You'll learn how to tailor your project to your specific circumstances. You'll be less likely to make mistakes that could mean your permit application is delayed or rejected.

Working with the experts will save you time.

Remember, too, if you don't obtain a permit, and start your project without one, you could be fined on the spot or taken to court for failing to apply.

And if you are charged and convicted of damaging fish habitat under the federal Fisheries Act, you could be fined or jailed, or both. (The maximum fine is $1,000,000 and/or six months' imprisonment.)

Getting a Permit

- Apply for the permit well in advance of the time you'd like to do the work. This means you should apply in the fall or winter for work to be done the following summer. The MNR may want to inspect the site after spring breakup — and certainly will, if your project affects important fish spawning areas. Keep in mind you face another time limitation: You won't be able to do the work during spawning periods, which vary with the type of fish.
- Notify your neighbors about the project. You have to fill in an "evidence of notification" form and your neighbors must sign it; they have 30 days to respond. The MNR will take their concerns into consideration in evaluating your application.

- Check municipal zoning bylaws to be sure you're not in conflict with local regulations. Check to see if you also need permission from the local conservation authority, the Canadian Coast Guard or Department of Fisheries and Oceans.
- Do your homework when you prepare the paperwork for your permit. You will have to supply a detailed map of the site, a sketch of the project or a survey of your property, specifications of what you want to do (shown on the sketch, with a description of the materials you'll use) and the completed evidence of notification. A photograph of the area (not in winter) is helpful to MNR in assessing your application. Note that you don't have to pay any fee for processing this paperwork.
- Wait for the MNR to conduct a site inspection. The ministry might deny your application but suggest how you could modify the project to get a green light. Or, the ministry might approve the project but attach certain conditions to its approval. You must comply with all the conditions.

The Ministry of Natural Resources has a guide to shoreline projects, called "Shoreline Conservation and Work Permits" that describes the permit process and what projects can be undertaken. Contact the local ministry district office for a copy.

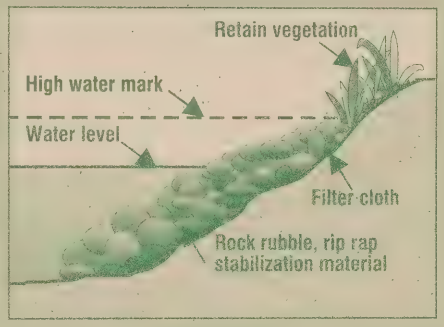
Some Environmentally-Friendly Ideas for Improving Your Shoreline

The less impact your project has on the shoreline, the more likely your permit is to be approved. Remember, your project may seem minor in the vast scheme of things, but if you and all your cottage neighbors are all undertaking "minor" projects, the cumulative effect could be devastating to the lake.

Think about how you can do the work in a way that least degrades the environment, and set it all out in your permit application.

Here are some common shoreline projects and some suggestions on environmentally-friendly ways to do them:

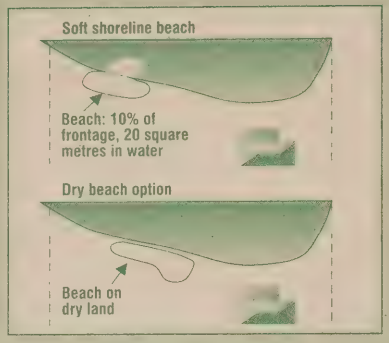
Do you want to ***build a retaining wall,*** or ***control erosion*** at the shoreline? A simple but effective way to do that is to keep up existing, and plant new, natural vegetation, such as shrubs and small trees.



Rock Rubble:
A natural shoreline stabilizer

The next-best alternative is to put down rock rubble and boulders. This "natural wall" effect, sloping gently up onto land, offers erosion control and habitat for fish and invertebrates. If you lay down filter cloth first, you'll help stabilize the slope a little more and prevent sediments from entering the lake. And if you plant more vegetation back from the fill, you'll provide for even more stabilization.

(Projects that MNR will usually *not* approve include concrete docks, vertical retaining walls, groynes or breakwalls on public land, filling beyond the normal shoreline, clearing vegetation right to the waterline, or wholesale removal of aquatic vegetation and rocks.)



Creating Beaches

Do you want to ***create a beach*** where none existed before? Don't hope for too much — on some sites, sand could simply wash away, and as it erodes, it could damage the natural habitat.

Think about using heavy-grained sand, crushed stone, or fine gravel. One alternative could be to build a sand pit near (but not actually on) the water's edge. And don't overlook the possibility of a "floating beach" — a floating dock or swimming platform can give you the same amenities as a beach, with a lot less environmental impact.

When you plan any of the shoreline work described above, keep in mind that if your work involves physical restructuring — putting fill in the lake, or at the water's edge — the Ministry of Environment and Energy can help you. The MOEE has prepared guidelines describing the quality of the fill or sediment you can use.

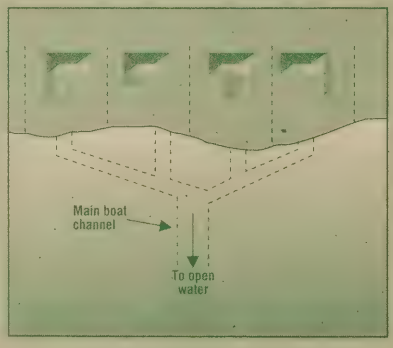
The guidelines will help you ensure you use only fill that is clean. It's important that you use only clean material; fill from contaminated sources can pollute the water and damage fish habitat. Contact the nearest MOEE office for information on the guidelines, so you can protect the environment and maintain the quality of the water.

Other shoreline projects you may be considering....

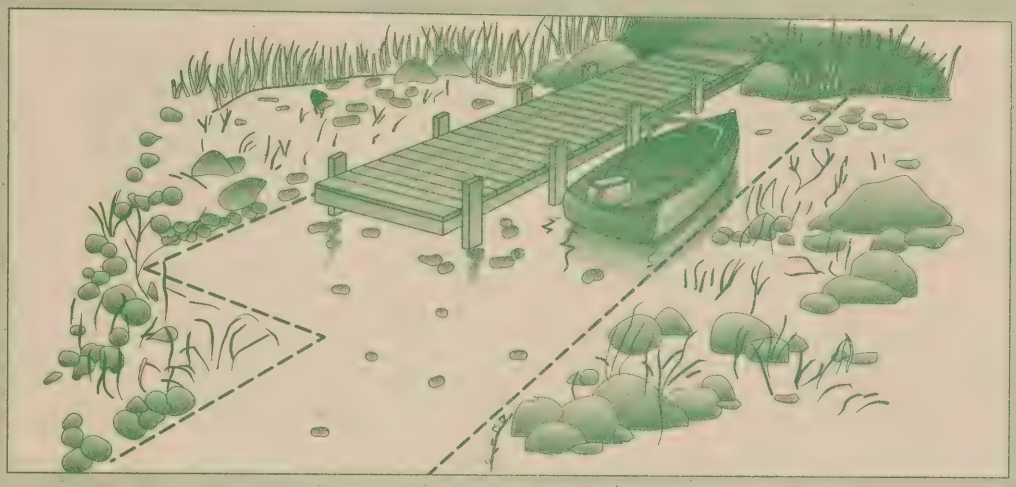
Do you really want to ***remove thick algae and plant growth?*** First, consider that aquatic plants are the basis of all life in your lake. They're central to the natural environment that's part of the enjoyment of a cottage. They provide vital habitat for fish and amphibians. Read "Keeping Aquatic Plants Under Control for Boating and Swimming".

Do you want to ***dredge a channel for your boat?*** Only existing lots are eligible for dredging projects. For a single boat, the channel will be limited to six metres (20 feet) in width.

Better yet, create a joint access channel with several neighbors by dredging one shared channel, no wider than eight metres (about 25 feet) for joint access. Then smaller channels can be split off from it. You could combine this with individual walkways leading to floating docks.



A Community Boat Channel



Single Boat Channel: Clear Only What You Need

Do you want to ***build a dock or boathouse?*** Read "Gimme Shelter: Building Docks and Boathouses", the next chapter in this section.

More for You to Read

To order the Ministry of Natural Resources publications included in the list below, telephone the Public Information Centre in Toronto at (416) 314-1553.

Planning certain activities on public lands and shore lands? Get an MNR Work Permit before you start. Pamphlet. Ministry of Natural Resources. ISBN 0-7729-7519-1.

Shoreline Conservation and Work Permits. Pamphlet. Ministry of Natural Resources. ISBN 0-7729-8537-5.

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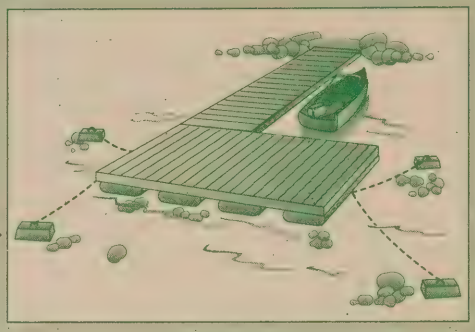
Gimme Shelter: Building Docks and Boathouses

Whether you're going fishing, waterskiing, or just out on the water, one of the pleasures of cottage living is boating. If you're thinking about buying a boat, you also need to think about where you're going to store or moor it. And that means you may want to build a dock or boathouse.

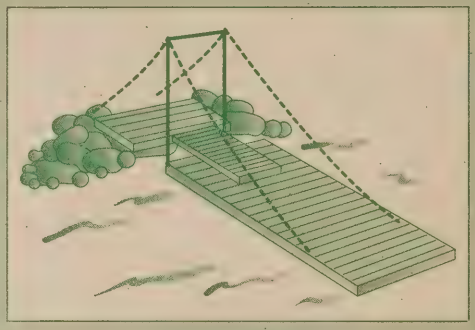
You should know that, small a project as it may seem, putting in a dock or a boathouse can have a detrimental effect on the aquatic environment and the plants, fish and other wildlife in it.

You should also know that precisely because of the effect construction can have on flora and fauna, anything you want to build in, on, or near the water requires a permit from the Ministry of Natural Resources. Read "All the Dirt on Shoreline Alterations", the chapter preceeding this one. It describes how shoreline work affects the aquatic environment and tells you how to apply for a permit.

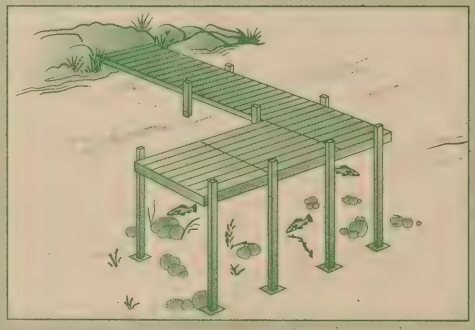
There are ways to build docks and boathouses so that they have a minimal effect on the environment. This chapter shows you some of those alternatives.



Floating Dock



Cantilever Dock



Post-Supported Dock

Floating Docks Mean Fewer Headaches and Better Fish Habitat

When you're planning to build a dock, consider floating, cantilever or post-supported docks — or combinations of these concepts — first. These structures won't disturb the existing lake bottom, or will have a minimal impact. They're the structures that the Ministry of Natural Resources recommends as being the most environmentally-friendly — so when you apply for a work permit to build such a dock, you're much more likely to get approval.

Floating docks consist of a wooden deck floating on the water, supported by buoyant materials such as clean, sealed plastic drums or rigid plastic foam. The

dock is kept in place by chains attached to concrete blocks anchored in the lake bed. (A word of warning: Don't use old steel drums — even if they're perfectly clean, they may still contain residues of their past contents that could be harmful. For example, the drums might have stored chemicals, gasoline, pesticides or inks — all harmful to the environment.)

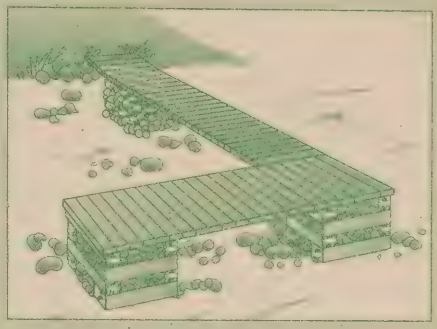
Floating docks are meant to be put in and pulled out of the water each season. You can store them under cover throughout the winter months — and that means you don't have ice damage to repair the following spring.

Cantilever docks are built so that one end of the dock is fixed to the shore while the wooden deck juts out over the water. Most of the weight of the structure is on the shore. The dock hangs over the water like a balcony. The far end may rest on floating drums or poles sunk vertically into the lake bed. These docks can be pulled straight up and back to shore, like a drawbridge.

On small inland lakes, cantilever docks can be simple structures made of wood; on larger lakes, part of the structure may be made of steel so it will withstand heavy wave action.

Post-supported docks are just what they sound like: Docks supported by posts (steel I-beams or wooden beams) that are vertically sunk into the lake bed. The narrow posts are an alternative to the traditional dock foundation or "crib" (described below); it allows natural wave action and fish and other wildlife to pass freely around it.

The least environmentally-friendly dock is the traditional arrangement in which the dock is supported by ***cribs*** — frameworks of timber arranged as pillar-like boxes and filled with stones, forming a foundation for the dock to rest on.



Crib Dock

In most instances, the Ministry of Natural Resources won't approve permit applications for large cribs and vertical planking, although smaller intermittent cribs ***might*** be approved. Cribs should not take up more than half the area under the dock.

Putting Your Boat Under Cover

What about building a boathouse?

One possibility is the ***floating boathouse***, which is kept in place in the same way a floating dock is — anchored to several concrete weights that are sunk in strategic positions in the lake bed.

Another possibility is building your boathouse on your own property, rather than over or near the water, which is considered Crown (public) land. You can install a ***marine railway*** that allows you to haul the boat to and from the water to the boathouse. (You still need to apply for a permit for this, even if the boathouse itself is on your own land.)

This type of boathouse offers year-round storage for your boat (not to mention your gardening tools and outdoor furniture!).

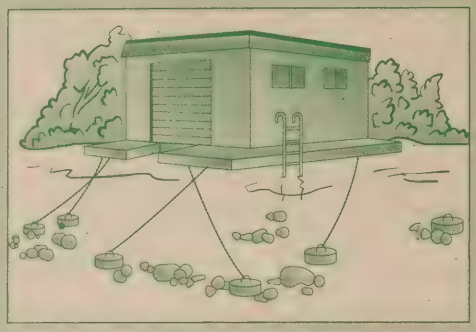
Another possibility, especially useful to cottagers whose property fronts onto shallow water, is the ***boat sling or "haul-up"***. This is a way of securing your boat in deeper water so you can canoe or raft out to it from shore. Imagine a post-supported dock without the dock — instead, you position your boat in between the posts and crank up supportive straps that then lift the boat up out of the water, supported by the posts. That's how a boat sling works.

Don't Forget to Apply for a Permit!

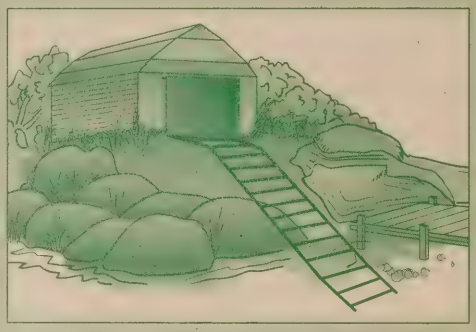
Before you do any work on a dock or boathouse, be sure to apply for a permit. If you don't, and start your project without it, you could be fined on the spot or taken to court for failing to apply.

If you are charged and convicted of damaging fish habitat under the federal Fisheries Act, you could face a fine of up to one million dollars and/or six months' imprisonment.

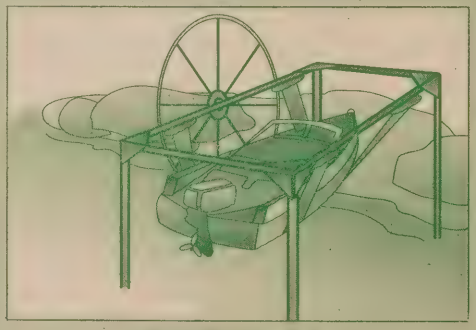
Contact the Ministry of Natural Resources district office nearest your cottage for information on applying for a permit.



Floating Boathouse



Marine Railway



Boat Sling or "Haul-up"

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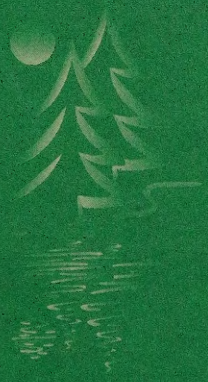

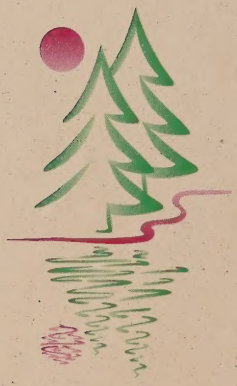

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